

University of Arkansas - Fort Smith
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General Syllabus

ISS 3103 Acoustical Physics and Instrumentation I

Credit Hours: 3 Lecture Hours: 3 Laboratory Hours: 0

Prerequisite: Admission into the diagnostic medical sonography degree program

Corequisites: ISS 3113 Cross-Sectional Anatomy and ISS 3102 Clinical Laboratory Practice

Effective Catalog: 2018-2019

I. Course Information

A. Catalog Description

Basic acoustical physics, principles of ultrasound instruments, modes of operation, operator control options, frequency selection, and echogenic properties discussed. Emphasis on ultrasound transmission in soft tissues, attenuation of sound energy, parameters affecting sound transmission, and resolution of sound beams.

B. Additional Information - None

II. Student Learning Outcomes

A. Subject Matter

Upon successful completion of this course, the student will be able to:

1. Describe the nature of sound.
2. Explain the principles of acoustical physics as they pertain to medical imaging.
3. Identify the operator controls on an ultrasound machine and explain the function of each.
4. Explain how the pulse-echo principle is used in sonography.
5. Describe the image formats used in sonography.
6. Explain what frequency is and why it is important in diagnostic ultrasound.
7. Compare continuous and pulse ultrasound.
8. Describe the attenuation of ultrasound as it travels through tissue.

9. Describe the construction of a transducer.
10. Explain how a transducer generates and receives ultrasound pulses.
11. Explain how a transducer receives echoes.
12. Differentiate between the two aspects of detail resolution.
13. Discuss the purpose of amplification, compensation, compression, demodulation and rejection.
14. Describe how images are stored electronically.
15. Discuss various recordings and archiving techniques.

B. University Learning Outcomes

This course enhances student abilities in the following areas:

Analytical Skills

Critical Thinking Skills: Students will think critically to reach viable solutions to a problem and justify those solutions to efficiently understand the parameters affecting sound transmission and resolution of sound beams.

Quantitative Reasoning: Students will assign and use numbers, read and analyze data, create models, draw inferences and support conclusions based on sound mathematical reasoning. Students will represent mathematical information symbolically, visually, numerically, verbally, and interpret models and data in order to draw inferences.

Communication Skills (written and oral)

Students will effectively communicate orally in a public setting.

III. Major Course Topics

- A. The Physics of Diagnostic Ultrasound
- B. Pulsed Ultrasound
- C. Pulsed Ultrasound Instrumentation
- D. Attenuation of Ultrasound
- E. Transmission Parameters
- F. Transducer